

is meant, not merely to promote a friendly intercourse among scientific men, but to be a kind of propagandist for the advancement of science through the general community. So we make a compromise between sober, serious, hard work for science on the one hand, and unrestrained festivities on the other. The German meetings keep less prominently before them the scientific culture of the world outside, and aim rather at the strengthening of the hands of the individual worker.

From the papers read at the different sections; from the discussion which they elicited; and still more perhaps from the public addresses on subjects of general interest given to the whole assembled meeting; one could gather some suggestive traits of the present current of thought in at least one great section of the cultivated society of Germany. What specially struck me was the universal sway which the writings of Darwin now exercise over the German mind. You see it on every side, in private conversation, in printed papers, in all the many sections into which such a meeting as that at Innsbruck divides. Darwin's name is often mentioned, and always with the profoundest veneration. But even where no allusion is specially made to him, nay, even more markedly, where such allusion is absent, we see how thoroughly his doctrines have permeated the scientific mind even in those departments of knowledge, which might seem at first sight to be furthest from natural history. "You are still discussing in England," said a German friend to me, "whether or not the theory of Darwin can be true. We have got a long way beyond that here. His theory is now our common starting point." And so, as far as my experience went, I found it.

But it is not merely in scientific circles that the influence of Darwin is felt and acknowledged. I do not think it is generally known in England, that three years ago, when, after the disastrous war with Prussia, the Austrian Parliament had assembled to deliberate on the reconsolidation of the empire, a distinguished member of the Upper Chamber, Professor Rokitsky, began a great speech, with this sentence:—"The question we have first to consider is, Is Charles Darwin right or no?" Such a query would no doubt raise a smile in our eminently unspeculative houses of legislature. But surely never was higher compliment paid to a naturalist. A great empire lay in its direst hour of distress, and the form and method of its reconstruction was proposed to be decided by the truth or error of the theory of Darwin. "The two men," said one able physician of Vienna to me (himself, by the way, a North-German), "who have most materially influenced German thought in this country are two Englishmen—George Combe and Charles Darwin."

There was another aspect of the tone of thought at Innsbruck, which could not but powerfully impress a Briton. Although we were assembled in the most ultra-Catholic province of Catholic Austria, there was the most unbridled freedom of expression on every subject.

In an address on recent scientific progress, Helmholtz thus expressed himself—"After centuries of stagnation physiology and medicine have entered upon a blooming development, and we may be proud that Germany has been especially the theatre of this progress—a distinction for which she is indebted to the fact that among us, more than elsewhere, there has prevailed a fearlessness as to the consequences of the wholly known Truth. There are also distinguished investigators in England and in France, who share in the full energy of the development of the sciences, but they must bow before the prejudices of society, and of the Church, and if they speak out openly, can do so only to the injury of their social influence. Germany has advanced more boldly. She has held the belief, which has never yet been belied, that the full Truth carried with it the cure for any injury or loss which may here and there result from partial knowledge. For this superiority she stands indebted to the stern and disinterested enthusiasm which, regardless alike of external

advantages and of the opinions of society, has guided and animated her scientific men."

This liberty of expression, however, seemed sometimes apt to wear not a little the aspect of a mere wanton defiance of the popular creed. Yet it was always received with applause.

In an address on the recent progress of anthropology, Karl Vogt gave utterance to what in our country would be deemed profanity, such as no man, not even the most free-thinking, would venture publicly to express. Yet it was received, first with a burst of astonishment at its novelty and audacity, and then with cries of approval and much cheering. I listened for some voice of dissent, but could hear none. When the address, which was certainly very eloquent, came to an end, there arose such a prolonged thunder of applause as one never hears save after some favourite singer has just sung some well-known air. It was a true and hearty *encore*. Again and again the bravos were renewed, and not until some little time had elapsed could the next business of the meeting be taken up. Not far from where I was standing, sat a Franciscan monk, his tonsured head and pendent cowl being conspicuous among the black garments of the *savans*. He had come, I daresay, out of curiosity to hear what the naturalists had to say on a question that interested him. The language he heard could not but shock him, and the vociferation with which it was received must have furnished material for talk and reflection in the monastery.

ARCH. GEIKIE

TRIASSIC DINOSAURIA

IT will probably interest geologists and palæontologists to know that a recent examination of the numerous remains of *Thecodontosauria* in the Bristol Museum, enables me to demonstrate that these Triassic reptiles belong to the order *Dinosauria*, and are closely allied to *Megalosaurus*. The vertebræ, humerus, and ilium, found in the Warwickshire Trias, which have been ascribed to *Labyrinthodon*, also belong to *Dinosauria*. The two skeletons obtained in the German Trias near Stuttgart, and described by Prof. Plieninger, some years ago, are also unquestionable *Dinosauria*; and, as Von Meyer is of opinion, probably belong to the genus *Teratosaurus*, from the same beds. Von Meyer's *Plataosaurus*, from the German Trias, is, plainly, as he has indicated it to be, a *Dinosaurian*.

As Prof. Cope has suggested, it is very probable that *Bathygnathus*, from the Triassic beds of Prince Edward's Island, is a *Dinosaurian*; and I have no hesitation in expressing the belief, that the *Deuterosaurus*, from the Ural, which occurs in beds which are called Permian, but which appear to be Triassic, is also a *Dinosaurian*. It is also very probable that *Rhopalodon*, which occurs in these rocks, belongs to the same order. If so, the close resemblance of the South African *Galesaurus* to *Rhopalodon*, would lead me to expect the former to prove a *Dinosaur*.

I have found an indubitable fragment of a *Dinosaurian* among some fossils, not long ago sent to me, from the reptiliferous beds of Central India, by Dr. Oldham, the Director of the Indian Geological Survey. Further, the determination of the *Thecodonts* as *Dinosauria*, leaves hardly any doubt that the little *Ankistrodon* from these Indian rocks, long since described by me, belongs to the same group.

But another discovery in the same batch of fossils from India, leaves no question on my mind that the Fauna of the beds which yield *Labyrinthodonts* and *Diacyodonts* in that country, represents the terrestrial Fauna of the Trias of Europe. I find, in fact, numerous fragments of a crocodilian reptile, so closely allied to the *Belodon* of the German Trias, that the determination of the points of difference requires close attention, associated with a *Hyperodapedon*, larger than those discovered in the Elgin Sandstones, but otherwise very similar to it.

Thus, during the Triassic epoch, extensive dry land seems to have existed in North America, Western and Central Europe, Eastern Europe, Central India, and South Africa, as it does now; and, throughout this vast area, the *Dinosauria*—the links between reptiles and birds—seem to have been represented by not fewer, probably by many more, than nine or ten distinct genera.

I hope, shortly, to have the honour of placing the details of the researches into the structure and distribution of the *Dinosauria*, in which I have been engaged for the last two years, and of which the above notice is one of the results, before the Geological Society.

T. H. HUXLEY

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his Correspondents.]

The Suez Canal

THE all-engrossing topic of the day is the Suez Canal, about which some diversities of opinion still exist. As for many years back I have had my attention particularly drawn to some of the chief matters in dispute, having been engaged on the largest irrigation works in India, I venture to trouble you with the following remarks.

Engineering science and indomitable energy have, in the case of the Suez Canal, overcome difficulties which at one time were considered insurmountable; but even up to the present moment doubts still exist, and some fear that the whole scheme may yet prove a failure, owing to the débris of the Nile travelling eastward transported by the currents of air and water. That we can overcome the former is, in my opinion, beyond all doubt; for it is found that whenever an irrigation channel is run out from the Jumna Canal into the great desert of Northern India, rich vegetation takes the place of arid sand. And so in Egypt will irrigation force back the desert; so the only question is, Can irrigation be carried out on an extensive scale? And of this also I have no doubt, for the enormous volume of water which now flows into the sea and is lost, is quite sufficient to reclaim the whole of the desert.

It may be asked, Can the water be made to flow over the desert? And of this I hold that there can also be no doubt. The very name of the Timsa Lake proves, I think, that the Nile, or at least a branch of it, flowed eastward, for the word *Timsa* signifies crocodile, showing that the water must at one time have been brackish or fresh, for these creatures could not have existed in this lake had it been salt as at present. If, therefore, a portion of the Nile water at one time flowed eastward, there can be no great engineering difficulty to make it do so again; and I am almost inclined to think that it would have been better to have made the canal a fresh-water one, for it is only by vegetation, the produce of irrigation, that the desert can be kept under control. Other advantages may be cited, such as cleaning the bottom of ships by bringing them into fresh water, and the prevention of any of the disturbed and very muddy waters along the Mediterranean coast getting admission into the canal; for by keeping the water in the canal at a higher level than that of the sea at both ends there could only be an outflow. So all the water wasted would be expended on lockage.

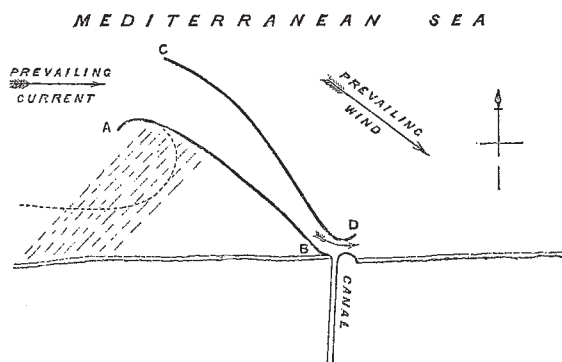
It may be objected that the fresh-water canal would get silted up by the muddy waters of the Nile; but could not this Timsa Lake be used as a silt-trap? I do not mean to say, that the present canal will be a failure because it has not been made a fresh-water one; but what I do think is, that possibly in the end a fresh-water canal would have been best and perhaps cheapest, as the dredging of the canal might have been much reduced,* as the water could have been kept at a higher level in the canal.

The great difficulty, however, to contend against, appears to me to be to keep a deep-water channel at the Mediterranean end of the Canal; and what drew my attention to this more than a dozen years ago, was the fact that the harbour of Alexandria does

not get silted up. Some have supposed that the subsidence of the delta accounts for this, and that the small advance of the land on the sea in this direction is owing to a constant sinking of the land. In my opinion a very different cause can be assigned: Nature here is working by a very different agency, namely, the current in the Mediterranean which flows eastward all along the African coast, and transports the débris of the Nile, depositing it all along the western portion of the Mediterranean. The fact of the Timsa Lake being at one time fresh or brackish, goes to support this view; so the only question is, Will the cost of continuous dredging be so excessive that the Canal will become a financial failure? On this point I cannot venture to give an opinion, as I have no data, but I think this difficulty may be met by forcing this easterly current to aid in keeping the mouth of the Canal clear of silt deposits.

What aids this current to transport the earthy matter is the beat of the sea always stirring the mud and sand up on the coast, and enabling the water to hold a large proportion of matter in suspension, and even to transport heavy matter.*

The proportion of earthy matter a short distance out to sea is comparatively little, so the great object appears to me to prevent the agitated water travelling as it does at present, and this can be done by arranging the breakwaters somewhat as shown in this diagram.



The breakwater AB is intended to prevent the very muddy water travelling along the coast, and the point A should extend well out into deep water. The breakwater CD is to direct the comparatively pure water where the sea is deep to pass across the mouth of the canal; and by the funnel-mouthed shape thus given, the velocity at D will be increased, and thus keep deep water at the head of the canal. Some may say that the expense will be enormous, and that it will have to be year after year extended. But, in reply to this, I say that deltas do not extend out into the sea at so rapid a rate as some suppose; and that the formation of a delta takes several thousands of years to accomplish, so that in this very delta, the advance is hardly perceptible; and that a sinking of the land has been brought forward, to account for the very slow progress made; while, in fact, Nature has at present a power at work which is quite sufficient to explain the reason why so little advance is made on the sea during the historic period (see my paper on the Delta of the Irrawaddy, read before the Royal Society of Edinburgh in 1857).

In conclusion, I have no doubt this Suez Canal will have many ready to abuse it and say it is a total failure, as has been said of the Ganges Canal; but like the latter work, which last year saved some three million human beings from starvation, so will this canal, I have little doubt, outlive the abuse, and become one of the greatest blessings to the civilised world.

T. LOGIN, C.E., late of the Ganges Canal.

London, Oct. 29, 1869.

* I observe that, in a discussion at the Civil Engineers Institution, the total excavation of the Suez Canal is stated to be 70,000,000 cubic metres. The excavation of the Ganges Canal was 2,547,000,000 cubic feet, or a little over 70,000,000 metres; but this latter does not include some 3,000 miles of distribution channels.

* At Felixstowe, last March, during a gale of wind, I watched a mass of brickwork, some eighteen inches square and about six inches thick, moved along the coast by the action of the waves, which were in an oblique direction to the coast, and no doubt the same takes place along the mouths of the Nile. By a sample I took of this agitated water, I found it contained 0.7375 per cent. of its weight of small pebbles, sand, and mud. This sample was taken at a height of nearly ten feet above the sea, and was got by catching the spray of the sea as it was falling.